THE WEST LOUISVILLE AIR TOXICS PROJECT
LOUISVILLE, JEFFERSON COUNTY, KENTUCKY

AIR MONITORING
QUALITY ASSURANCE PROJECT PLAN

July 19, 2000

A COMMUNITY-BASED
ENVIRONMENTAL PROTECTION PROJECT

US EPA Region 4
Air Pollution Control District
Of Jefferson County

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1.0 INTRODUCTION

The study described in this document is one facet of a Community-Based Environmental Protection (CBEP) project that will assimilate available air, ground water, surface water, and soil environmental data to present a multi-media characterization of risk due to environmental pollutants in the West Louisville area. The primary objective of the air toxics monitoring portion of this project is to determine if residents of the neighborhoods in the area are being exposed to airborne concentrations of hazardous air pollutants that may pose unacceptable health risks.

The CBEP team that is overseeing this air quality monitoring project includes the following groups:

- The Air Pollution Control District of Jefferson County (APCD);
- United States Environmental Protection Agency (EPA) Region 4 - Air, Pesticides, and Toxics Management Division (APTMD) and Science and Ecosystem Support Division (SESD);
- The West County Community Involvement Project Task Force (West County Task Force);
- The Kentucky Pollution Prevention Center (KPPC) at the University of Louisville;
- The Kentucky Institute for the Environment and Sustainable Development (KIESD) at the University of Louisville; and
- The University of Louisville Air Quality Laboratory (AQL).

This Quality Assurance Project Plan (QAPP) lays out the methodologies, procedures, and other requirements necessary for collecting data adequate to support the goals of the project. Ultimately, the air toxic data gathered in this study will be used to assess risk posed to human receptors through inhalation. The risk assessment will result in both quantitative and qualitative expressions of risk and will include an evaluation of associated uncertainties. In addition, a risk management plan will also be developed to identify acceptable air risk levels and form the basis for actions that may be taken in response to any unacceptable risks found.

2.0 BACKGROUND

The West Louisville air toxics study area encompasses the most dense concentration of industry within the state of Kentucky. Bounded by the Ohio River and downtown Louisville, it includes portions of both the City of Louisville and Jefferson County, as well as the "Rubbertown" industrial complex - a four square-mile area of numerous large and small industries. The study area encompasses the neighborhoods of Russell, California, Chickasaw,

Parkland, Park Duvalle, Shively, Portland, Cane Run, Riverside Gardens, Hallmark, Lake Dreamland and Shawnee. There are approximately 70,000 residents in this area, of which about 65% are minorities and approximately 30% live below the poverty level.

Rubbertown was initially developed in 1918 with the siting of three petroleum refineries and a railroad tie manufacturer. At the outbreak of World War II, the U.S. Office of War Production and Management contracted to construct an acetylene gas production plant and several synthetic rubber plants (hence, the name) to produce needed war material. After World War II, these plants were sold to private corporations that produced synthetic rubber, vinyl chloride monomers, and acetylene gas. Additional facilities built since 1960 produce chemicals including freon, plastic and acrylic monomers, formaldehyde and phenolic resin. In addition, the area is the location of Louisville's main wastewater treatment plant (Morris Foreman), a former National Priority List site (Lees Lane), closed landfills, petroleum terminals, an array of small manufacturing and service industries, and is bordered by a metropolitan interstate highway.

Residents in adjacent urban neighborhoods are potentially exposed through multiple pathways (air, water, soil) to a mixture of chemicals from large industrial facilities, smaller businesses, mobile, and other sources. However, the exact nature and concentration of pollutants in these various environmental media are largely unknown. When citizens petitioned the Agency for Toxic Substances and Disease Registry (ATSDR) in 1992 to conduct a health assessment of the community, that Agency concluded that the health risks were "indeterminate" due to the lack of ambient environmental data, predominately air toxic concentrations. [1]

Citizens have continued to express concern about these potential adverse impacts to the environment from ongoing industrial practices as well as the cumulative environmental and health effects from the concentration of industry in their community. The public is also concerned that improper waste disposal practices, which were routine prior to the 1970s, have resulted in contamination of the land and groundwater.

The West County Task Force, including representatives from the neighborhood associations and other community members, industry, environmental groups, and local government recently articulated these concerns by expressly identifying six environmental areas of highest priority, 15 recommendations, and 38 action items. The six top priorities of the task force include:

- Industrial odors in the area;
- Air pollution;
- Surface Water quality
- Community right-to-know and access to environmental information;
- The need for health assessments; and
- Access to quality, affordable health care.

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1 The ATSDR also concluded that insufficient information was available to characterize soil exposures. That issue, however, is not dealt with in this QAPP.

This study is focused on developing the information necessary to assess and address only one of these six priorities, namely the direct impact of air pollution on public health.

2.1 Air Pollution Sources and Chemicals to be Monitored in this Study

Although the origin of air pollutants in the community are potentially from a wide range of sources (e.g., large facilities, small businesses, cars and trucks, and sources outside of Jefferson County), primary concern has focused on air pollutants released from the Rubbertown industries, particularly emissions of volatile organic compounds (VOCs). Table 1 lists the reported pounds of chemicals released to the air in 1996 and 1997 by industries in the Rubbertown area. The releases suggest that a primary focus of this study should be on VOCs, semi-volatile organic chemicals (SVOCs), formaldehyde, and reactive aerosols. However, metals in particulates also pose a potential health concern, given the urban nature of the study area, and the several coal-fired boilers in the vicinity. As such, this group of chemicals has also been included among the chemicals to be monitored and assessed for risk. Thus, the specific chemicals (or groups of chemicals) selected for monitoring in this study are:

- VOCs;
- SVOCs;
- Formaldehyde;
- Metals in Particulates; and
- HCl and HF.

3.0 STUDY REQUIREMENTS

3.1 Overall Objective

The West Louisville air toxics study began in the summer of 1999, with preliminary monitoring in the study area by the APCD and KIESD. Ultimately, a total of 12 monitoring locations will be established in the study area which will collect air quality samples for approximately one year. The overall goal of this monitoring effort is to collect data of sufficient quantity and quality to allow a risk assessment of both chronic and acute inhalation exposures by people to be conducted. The following sections outline the various details of the study and the requirements necessary to develop a data set adequate for risk assessment purposes.

Table 1
Air Toxic Releases from Rubbertown Industries

Chemical Reported to the Toxics Release Inventory (TRI)	1996 Emissions (pounds)	1997 Emissions (pounds)
Chlorodifluoromethane (HCFC-22)	3,906,218	3,179,453
Toluene	1,443,769	3,248,364
Chloroprene	511,901	438,795
Methyl Methacrylate	170,000	170,000
Methanol	105,090	12,000
Acrylonitrile	103,592	99,353
Styrene	83,857	77,542
Hydrochloric Acid	63,527	66,799
1,3-Butadiene	62,735	66,159
Ammonia	50,112	68,670
Ethyl Acrylate	27,057	26,998
Hydrogen Fluoride	21,946	32,871
Di-(2-Ethylhexyl)Phthalate	14,886	13,210
Butyl Acrylate	10,600	11,534
Vinyl Chloride	9,310	8,098
Formaldehyde	2,603	4,802
Phenol	2,176	4,496
Xylene	1,739	4,491
Other*	14,650	36,230
TOTAL	***6,605,768***	***7,555,215***

*Remaining chemicals released in relatively small quantities.

3.2 Monitoring Sites

A total of 12 monitoring locations will be deployed throughout the study area (***see Section 4 for a detailed description of how and why these locations were selected***). For the purposes of this study, the following definitions are understood:

- A ***Monitoring Site*** is the physical location of an air monitor or group of air monitors. Multiple monitoring devices may be located at a monitoring site. However, each monitoring site is identified by only one EPA Aerometric Information Retrieval System (AIRS) ID number.

- A ***Monitoring Station*** is a collection of monitoring devices at a monitoring site. Generally, a monitoring station will have multiple monitoring devices to collect different types of samples. For example, a monitoring station may have one device to capture a VOC sample, another to capture an SVOC sample, another for metals in particulates, one for formaldehyde, and yet another for reactive aerosols. There may be multiple monitoring stations at a single monitoring site.

- ***Duplicate Monitors*** are two or more monitoring stations at a monitoring site that capture the same number and types of samples contemporaneously.

In this study, there are a total of 12 monitoring sites and 15 monitoring stations. A breakdown of these sites is as follows:

- Six of the monitoring sites were established by EPA SESD. These are called **Group 1** monitoring sites. Each Group 1 monitoring site has a single monitoring station, with the exception of the Ralph Avenue/Campground Road Site, which has two monitoring stations (a main monitoring station and a duplicate monitoring station). Thus, Group 1 monitoring sites include a total of seven monitoring stations. Each Group 1 monitoring station will have five different monitoring devices that will collect samples for the following chemicals or groups of chemicals:

  - ✓ VOCs;
  - ✓ SVOCs;
  - ✓ Metals in particulates;
  - ✓ HCl and HF; and
  - ✓ Formaldehyde.

- Six additional monitoring sites were established by APCD/KIESD. These monitoring sites are at different locations than those established by EPA SESD. These are called **Group 2** monitoring sites. Each Group 2 monitoring site has a single monitoring station with a single monitoring device (VOC monitor only), for a total of six APCD/KIESD monitoring stations.

- APCD/KIESD has also established VOC monitors (a main Group 2 VOC monitor and a duplicate Group 2 VOC monitor) at EPA SESD's Ralph Avenue/Campground Road monitoring site. These monitors will collect samples every 12 days and on the same schedule as the Group 1 monitors. Thus, for VOCs, the Ralph Avenue/Campground Road site has four duplicate VOC monitors; two Group 1 VOC monitors and two Group 2 VOC monitors. In addition, once a quarter, APCD/KIESD will deploy two additional VOC canisters at is monitoring site; one will be sent to SESD's lab in Athens and one will be sent to the KY DES lab. This will provide additional intralab comparability data.

3.3 Data to be Collected

As noted above, air will be monitored and analyzed for VOCs, SVOCs, formaldehyde, reactive acidic aerosols, and metals in suspended particulate at all six Group 1 monitoring sites. VOCs only will be monitored at the six APCD/KIESD monitoring sites and at the duplicate site at Ralph Avenue/Campground Road.

In addition, meteorological data will be collected by the APCD at the Louisville Department of Police Firearms Training monitoring site (a Group 1 monitoring site). The meteorological data will not be directly used in the risk assessment, but, rather, will be used as supporting data in preliminary source apportionment, should elevated concentrations of specific pollutants be detected.

3.4 Laboratories to be Utilized

The following labs will be used to analyze the data collected in this analysis. Additional detail on the labs used and requirements associated with the labs can be found in the subsequent sections.

- VOC, SVOC, metals in particulates, and HF and HCl in reactive acidic aerosol samples collected from Group 1 monitors will be analyzed by the EPA SESD laboratory in Athens, Georgia.

- Formaldehyde samples collected from Group 1 monitors will first be sent to EPA SESD. EPA will then forward the samples on to an EPA contract lab for analysis [Performance Analytical, Simi Valley, California (PAL)].

- VOC samples from Group 2 monitors will be analyzed by the University of Louisville AQL.

- Quarterly VOC split samples from the Group 2 duplicate VOC monitor at the Ralph Avenue/Campground Road monitoring site will be analyzed by the Commonwealth of Kentucky Department of Environmental Protection, Division of Environmental Services (KY DES) lab.

3.5 Data Quality Objectives

The EPA Data Quality Objectives (DQO) Process, based on the EPA's Analytical Service Branch's (ASB) *Quality Assurance Manual*, was utilized in the design of this QAPP. The steps taken in the DQO process, which are summarized in Table 2, resulted in the following four statements and goals for this study:

Table 2
DQO Process as Utilized for West Louisville Air Toxics Study

DQO Step	DQO Action
1. State the Problem	Residents of west Louisville, Kentucky are concerned that they are being exposed to unsafe concentrations of toxic air pollutants as the result of atmospheric releases of pollutants by local industries, area and mobile sources.
2. Identify the Decision	By utilizing data collected during this yearlong study of toxic air pollutants in the area, EPA will develop the data necessary to conduct a risk assessment of ambient air in order to determine whether the residents are being exposed to unsafe concentrations of toxic air pollutants.
3. Identify the Inputs of the Decision	This air toxic monitoring plan monitors for the most of the hazardous air pollutants listed in the TRI database for the Rubbertown complex for which standard EPA sampling and analysis methodology exists.
4. Define the Study Boundaries	The study is confined to the area shown in Figure 1 with the study area focused on neighborhoods located in the west Louisville area.
5. Define a Decision Rule	The air toxics study will use established EPA monitoring methods and a one in 12 day sampling cycle to provide a statistically representative characterization of air toxics concentrations in the study area.
6. Limits of Decision Errors	All methodology is derived from the EPA *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air* and the Kentucky Division of Environmental Services (DES) Standard Operating Procedures. The duplicate samples will provide a clear measure of method error by the end of the study.
7. Optimize the Design	This study plan will be reviewed by a panel of experts in disciplines ranging from analytical chemistry, to risk assessment, to air toxics monitoring.

1. **Precision and accuracy** - these are quantitative measures that characterize the amount of variability and bias inherent in air toxic data set. The duplicate monitors at the Ralph Avenue/Campground Road site were established to provide precision data for each of the sampling methods utilized in this study. For VOCs, four monitors are routinely present. Thus, each sampling event will result in two samples of each group of chemicals from this location (four for VOCs). For this study, the results from the duplicate samples are expected to be within ± 25% of one another.

   As noted previously, for VOC sampling, precision data will be augmented by collocating two additional duplicate monitors at the Ralph Avenue/Campground Road monitoring site. All four VOC monitors will sample VOCs contemporaneously on a regular 12-day cycle (see Sections 5 and 6). In addition, the APCD/KIESD duplicate VOC monitor will be split, on a quarterly basis, with the KY DES laboratory to allow for additional intralaboratory and

interlaboratory data validation, verification, and comparison. Also, approximately once a quarter, two additional VOC canisters will be deployed to collect an extra sample for each of the SESD and KY DES labs. To distinguish among these various duplicate VOC samples, the Parameter Occurrence Codes (POC) listed in Table 3 will be used to identify the samples.

2. **Representativeness** – the sampling schedule selected for this study is one sampling event every 12 days for a full year at 12 monitoring sites. Cycling through the days of the week in this manner will provide for a more representative sampling of seasonal differences, daily emission and exposure differences, and meteorological differences. The location of the monitors is intended to capture a variety of exposure types, including areas of maximum impact, average neighborhood exposures, baseline urban exposures, and background sites to measure concentration levels transported into the metropolitan area.

3. **Completeness**- the completeness of data recovery of this study is intended to be at least 75%.

4. **Comparability** – this refers to the ability to compare data from different sources with a degree of confidence. The West Louisville CBEP data set will be compared with a statewide air toxic data set derived from a full year study by the Kentucky Division for Air Quality (KY DAQ; see Appendix F for KY DAQ network information). The goal is to conduct both the West Louisville air toxics study and the Commonwealth study using the same sampling dates and frequency. However, if the sampling events must be moved ahead or postponed (for example, due to any forecasted or actually unfavorable weather patterns), the make-up samples will be scheduled according to the rules in Section 5.

Table 3
Parameter of Occurrence Codes
Ralph Avenue/Campground Road
VOC Samples

Parameter of Occurrence Code (POC)	Type of data submitted	Approximate Number of Samples Collected	Notes
1	Group 1 – Main VOC Monitor	31	Sample collected and sent to EPA SESD in Athens, Georgia every 12 days.
2	Group 1 – Duplicate VOC Monitor	31	Sample collected and sent to EPA SESD in Athens, Georgia every 12 days
3	Group 2 – Main VOC Monitor	31	The Group 2 sample is collected and sent to University of Louisville AQL every 12 days.
4	Group 2 – Duplicate VOC Monitor	4	The Group 2 sample is collected and sent to University of Louisville AQL every 12 days. Once a quarter, this sample is split with the University of Louisville AQL and the Kentucky DES Lab. This POC is used to identify both the AQL and the Kentucky DES portions of the split.
5	Group 2 – SESD Interlab VOC Monitor	Minimum of 4	A separate VOC canister will be deployed approximately every quarter and sent directly to EPA SESD.
6	Group 2 – KY DES Interlab VOC Monitor	Minimum of 4	A separate VOC canister will be deployed approximately every quarter and sent directly to KY DES.

*The POC codes for all monitors are provided in Appendix D.

3.4 Required Quantitation Limits

In order to perform an adequate risk assessment on air quality sample results, the analytical labs need to achieve a lower limit of quantitation for each chemical that is at or below its respective health protective benchmark. For this study, these health benchmarks were taken from the USEPA Region 3 Risk Based Concentration (RBC) table and are protective of carcinogenic effects at a risk level of one in one million, or, for noncarcinogenic effects at a hazard quotient of 0.1, which ever is lower. In the event there is no benchmark for a particular chemical, or the analytical methodology of the lab cannot achieve the required quantitation limit specified herein, the labs are required to provide the lowest quantitation limit achievable by their available methods.[2] The risk assessment, in that case, will discuss the uncertainties associated with not having achieved the desired quantitation limit for any given chemical.

Appendix A lists the quantitation limits required to conduct this assessment. Also listed are the quantitation limits that are actually achievable by EPA SESD and the University's AQL.

It should be noted that EPA routinely updates its list of acceptable risk-based quantitation limits for air toxics studies. As such, the chemical-specific required quantitation limits outlined in Appendix A may be revised (either upwards or downwards) in the future. Any uncertainties with not having met a particular required quantitation limit in the chemical analysis phase of the project will be discussed in the risk assessment.

4.0 ELEMENTS OF THE PROJECT

4.1 Project Management

The project will be directed by the CBEP Team. Specifically, the West County Task Force will provide public input into the study design, identify sites for proposed monitors, review data generated, and be responsible for public outreach on the project results. APCD, with assistance from KIESD, will maintain and collect samples at all twelve monitoring sites. EPA SESD will assist APCD with installation of equipment at the sites and remedial activities. See Appendix B for a complete list of personnel involved and their roles.

2 Regardless of the required quantitation limits provided in this document, the analytical laboratories should always provide the lowest quantitation limit achievable by their available methods.

Responsibility for the analysis of the samples collected at the 12 monitoring sites will be generally be divided between EPA SESD and the University of Louisville AQL as described in Section 3.4 above. The Office of Quality Assurance at EPA SESD will provide quality assurance overview of the contract laboratory used for the formaldehyde analysis, internal quality assurance, quality assurance of the APCD/KIESD functions, and any technology transfer assistance that APCD/KIESD requests.

4.2 Monitoring Sites Selection and Siting Objectives

The 12 air monitoring sites selected by the West County Task Force for this study are described in Table 4 and shown on Figure 1. A total of 25 sites were considered by the Task Force and each site was visited by members of the Task Force in conjunction with air monitoring experts from the Kentucky DAQ, EPA Region 4, APCD and KIESD. The final site selection was conducted at a public meeting of the Task Force, with the objective of selecting sites that could measure the highest concentration of air pollutants (commonly called fenceline concentrations), ambient concentrations in neighborhoods in the study area, background concentrations and control concentrations. The objectives of the different types of monitoring locations are further detailed in Table 5. Additional information on the selected monitoring sites (e.g., address, AIRs ID Number, latitude/longitude), as well as the location of population centers and source locations, can be found in Appendix D.

The selection was conducted through an evaluation process that included assessing each location against siting criteria and developing a rank ordering of all sites for each of the noted site functions. APCD conducted air modeling studies which indicated that the points of highest concentration for releases from the Rubbertown complex were generally to the northeast, east, and southwest of the emission sources, with the concentrations diminishing with increased distance from the emission sources. The Task Force used the model results to assist in locating sites in the vicinity of the complex.

4.3 Sample Frequency

Sampling at Group 1 and Group 2 monitoring sites (including duplicate monitors) will be conducted for 24-hour periods once every 12 days. The tentative sample dates are shown in Appendix C. During the course of the year, this will result in 31 sampling events. Once a quarter, the APCD/KIESD VOC duplicate sampler at the Ralph Avenue/Campground Road Monitoring site will be split with the Kentucky DES lab. Also, once a quarter, two additional VOC monitors will be deployed at the Ralph Avenue/Campground Toad Monitoring site and will be sent directly to the SESD lab and the KY DES lab.

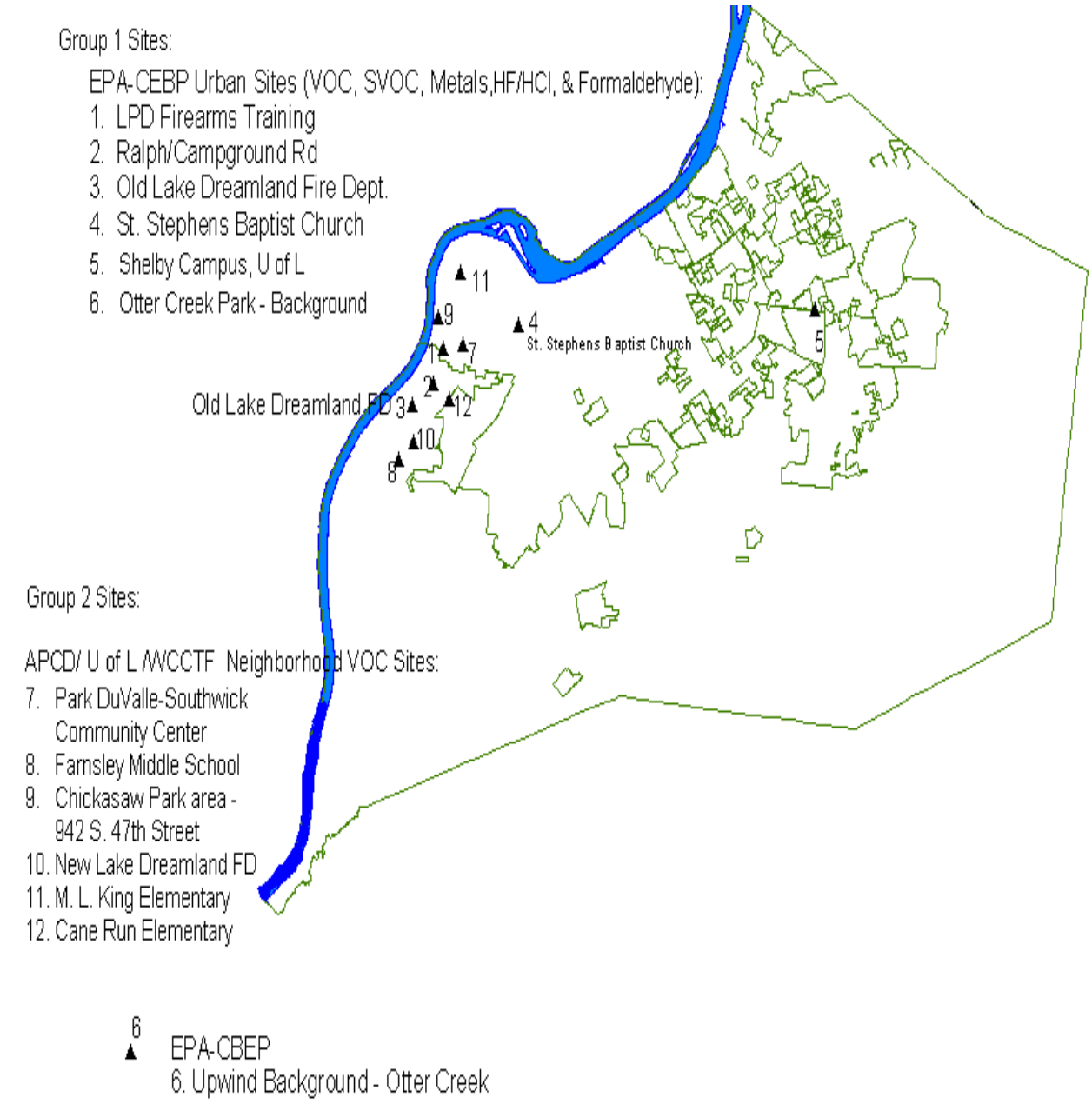
Table 4
AIR TOXIC MONITORING SITES (Group 1 and Group 2) -West Louisville Area

Monitoring Site Number	Site Name *Site Address*	Monitoring Target	Parameters	Comments
1	Louisville Police Firearms Training *4201 Algonquin Pkwy*	Fenceline	VOC, SVOC, HCl and HF, formaldehyde, metals SO_2 Meteorological	Maximum impact site for BF Goodrich, Zeon Chemicals, Geon Chemicals, Marathon Ashland Petroleum LLC, CITGO, BP Oil, Chevron USA Oil Terminals, Ashland Chemical, Police Firearms Training facility, and Morris Foreman POTW
2	Ralph Ave/ Campground Road *4211 Campground Rd.*	Fenceline General Neighborhood	VOC, SVOC, HCl and HF, formaldehyde metals Duplicate Monitors	Maximum impact site for DuPont, Rohm & Haas, Elf Atochem, American Synthetic Rubber Community exposure site for northern Cane Run neighborhood
3	Old Lake Dreamland Fire Dept. *4603 Campground Rd.*	Fenceline General Neighborhood	VOC, SVOC, HCl and HF, formaldehyde, metals	Maximum impact area for American Synthetic, Rohm & Haas, Elf Atochem, and Borden Chemical Community exposure site for Lake Dreamland and Cane Run neighborhoods
4	St. Stephens Baptist Church *1008 S 15th*	General Neighborhood	VOC SVOC, HCl and HF, formaldehyde, metals	Community exposure site for Russell, Parkland and California neighborhoods
5	U of L Shelby Campus *9001 Shelbyville Rd.*	Control	VOC, SVOC, HCl and HF, formaldehyde, metals	Control site to measure the impact of urban anthropogenic activities
6	Otter Creek Park *850 Otter Creek Park Rd, Brandenburg*	Background	VOC, SVOC, HCl and HF, formaldehyde, metals	Background site 25 miles southwest to assess transport of pollutants from outside of the metropolitan area into the study area
7	Park Duvalle Southwick Community Center *3621 Southern Ave.*	General Neighborhood	VOC PM2.5 Core (main & co), PM10 sites	Community exposure site for Park Duvalle neighborhood Existing APCD site (PM2.5, PM10) and will be relocated
8	Farnsley Middle School *3400 Lees Lane*	Fenceline General Neighborhood	VOC	Community exposure site for Cane Run, Riverside Gardens, and Shively neighborhoods
9	Chickasaw Park (private residence) *942 S. 47th Street*	General Neighborhood	VOC	Community exposure site for Chickasaw Neighborhood
10	New Lake Dreamland Fire Dept.) *4603 Cane Run Rd.*	General Neighborhood	VOC	Community exposure site for Cane Run and Shively neighborhoods
11	M.L. King Elementary School *4325 Vermont Ave.*	General Neighborhood	VOC	Community exposure site for Shawnee and Portland neighborhoods
12	Cane Run Elementary School *3951 Cane Run Road*	General Neighborhood	VOC	Community exposure site for Hallmark, Algonquin, neighborhoods

Table 5
Siting Objectives

SITE TYPE	MONITORING OBJECTIVE
Fenceline (potential maximum impact sites)	Objective is to characterize potential exposure of individuals living in areas where maximum impact from industries in the Rubbertown area may occur, based on modeling.
General neighborhood population exposure sites	Objective is to characterize the typical exposure of individuals living in areas located in the west Louisville area.
Background site	Objective of this site is to assess the pollutant concentration in the air mass as it is transported into Jefferson County. It is located in a generally upwind location far enough away and that is not typically impacted by emissions from the metropolitan area.
Control site	The objective of this site is to determine the air quality in residential areas of Jefferson county that should not often be impacted by emissions from the Rubbertown industrial complex. It is located in an area that is removed from, and not often downwind of the Rubbertown industrial complex.

Figure 1. Group 1 and Group 2 Air Toxic Monitoring Sites Locations



For SVOCs, formaldehyde, HF and HCl, and metals, a total of 868 samples will be collected (31 runs at seven Group 1 monitoring stations for four groups of parameters). For VOCs, a total of 465 samples (31 runs x 15 stations) will be taken. Twelve additional VOC samples will be collected for analysis by the SESD and KY DES labs for intralaboratory precision runs (for a grand total of 465 + 12 = 478 VOC samples). In addition, Kentucky's Division of Environmental Services (DES) has been asked to provide their mobile laboratory for one month during the study to allow real-time monitoring of VOCs and to define short-term emission events. Also, a field blank will be collected for each sampling method for each sampling event at a Group 1 station. This will result in a total of 155 field blank samples (31 runs x 5 parameters). Likewise, a field blank will be collected at a Group 1 monitoring site (for a total of 31 samples).

The analytical data developed by the EPA SESD lab will be stored in EPA SESD's computerized Laboratory Information Management System (R4LIMS) and the analytical data developed by the University of Louisville will be stored in their computer system. Data developed by the Kentucky DES lab will be stored in the Commonwealth's computer system. A new set of AIRS numbers have been assigned by the Kentucky DAQ for all new Group 1 sites and Group 2 sites (see Appendix D). Eventually, all air toxics data will be transferred to the EPA's AIRS data system.

5.0 SAMPLE COLLECTION

5.1 Monitor Operation and Sample Collection

APCD and KIESD (including a research assistant from the University of Louisville) will be responsible for sample collection and routine operation of both Group 1 and Group 2 air toxics monitoring sites. All air samples will be collected as specified in the EPA SESD *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual* (EISOPQAM), May 1996, which is incorporated by reference. All standard operating procedures and sampling collection methodologies for conducting air toxic monitoring in ambient air will also conform to Section 14 of SESD's EIB SOP. Collected samples will be immediately shipped to EPA SESD's Athens laboratory or transferred to the University of Louisville AQL. All samples will be stored in a secure sample custody area.

All samples will be accompanied by a chain of custody form, which will be signed by the sample collector and by the laboratory upon receipt of the samples and appropriate copies retained by the necessary parties. The University's AQL will maintain their chain of custody forms as a hardcopy in their lab for the Group 2 samples. A copy will be forwarded to the APCD, if requested. Since Group 1 samples (including formaldehyde) will be sent directly to EPA SESD in Athens, Georgia, the sampling party will retain appropriate hardcopies of the chain of custody forms for the samples they collect.

The formaldehyde samples collected at Group 1 monitoring sites will be analyzed by Performance Analytical, Inc., in Simi Valley, California (PAL). Once received, EPA SESD will forward the formaldehyde samples, along with necessary chain of custody paperwork, to this contract lab. EPA SESD will maintain hardcopies of appropriate chain of custody documentation as will the contract lab.

EPA SESD and the Kentucky DAQ will conduct quarterly flow checks, site inspections, and review of the sample collection procedures used. Initially, EPA SESD and Kentucky DAQ will make the sample collection runs with the local field scientist to verify that the QAPP and associated SOPs are being followed. If problems are identified, EPA SESD will provide technical assistance. During quarterly flow audit, all samplers will be checked for malfunctions. EPA SESD and/or Kentucky DAQ will assist APCD and KIESD in conducting repairs.

5.2 Monitoring Stations

Monitors will be placed on raised wooden platforms, one to two meters in height. Each monitoring station will be secured with privacy fencing to prevent security problems. Electric power drops will be installed for each station. As noted previously, individual monitoring stations may have one or more monitoring devices, depending on the type of monitoring site. For example, Group 1 monitoring sites will have one monitoring station with five monitoring devices. Group 2 monitoring sites will have one monitoring station with one monitoring device. The monitoring devices at each monitoring station will be installed, calibrated, operated and maintained in accordance with the procedures contained in the Kentucky DAQ's *Air Quality Monitoring and Quality Assurance Manual,* which is incorporated herein by reference.

5.3 Monitoring Methods

The following sections outline the monitoring methods that will be employed in this study to collect ambient air quality samples for the chemicals selected for evaluation.

5.3.1 VOC Monitoring

VOCs will be collected in six-liter Silcosteel canisters that use flow controllers to allow the pre-evacuated canister to fill slowly over a 24-hour period. The sampling will be initiated by an electronic timer that will open a solenoid valve and allow the air to begin to flow into the canister at a flowrate of approximately three and one half (3.5) cubic centimeters (cc) per minute. At the end of the 24-hour sampling interval, the timer will close the solenoid valve sealing the cylinder. The flow rate will be adjusted to allow approximately 5100 cc of air to be collected in the 6000cc canister during a 24-hour period. The sampling method will conform to Method TO-15 of the EPA *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air* (which is incorporated herein by reference). Detailed procedures for collection are contained in the

Kentucky DAQ's *Air Quality Monitoring and Quality Assurance Manual*, Section TS 17-17.

The sampling equipment to be used has been designated as an EPA reference standard. The canisters and flow control valves purchased by the University of Louisville and EPA are identical. Prior to the installation of samplers in the field, the performance of the analytical systems will be verified by the analyses of blanks and spike samples. This process will document the initial performance of the sampling/testing systems and assist in determining the applicability of these systems for measuring specific target analytes. All equipment will be certified as safe and shall be fully operational prior to use in the monitoring network. An adequate inventory of spare parts and canisters, supplies and equipment will be maintained.

5.3.2 SVOC Monitoring

SVOCs will be collected by the high-volume PUF/XAD method. A high-volume PUF/XAD sampler employs a glass fiber prefilter with a polyurethane foam (PUF) and XAD (a proprietary resin) backup absorbent cartridge to trap the organic compounds. Approximately 300 cubic meters (m^3) of air will be sampled during a 24-hour period.

The sampling method will conform to Method TO-13A of the EPA *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*. Detailed procedures for PUF sampling are contained in Kentucky DAQ's *Air Quality Monitoring and Quality Assurance Manual*, Section TS 17-16.

5.3.3 Formaldehyde Sampling

Formaldehyde will be collected on dinitro-phenylhydrazine saturated silica-gel Sep-Paks (DNPH cartridges). Approximately 1440 liters of air will be sampled through the DNPH cartridges. The sampling method will conform to Method TO-11A of the EPA *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*.

5.3.4 Metals in Particulates Sampling

Suspended particulates will be collected by the High Volume Particulate Method. The sampling method will conform to 40 CFR 50 Appendix G. This technique collects a particulate sample on a glass or quartz fiber filter. Air is drawn through the filter by a calibrated motor at a known flow rate over a 24-hour period. Detailed procedures for particulate sampling are contained in *Kentucky's Air Quality Monitoring and Assurance Manual*, TS 17-2.

5.3.5 HF and HCl

An annular denuder system (ADS) will be used to sample hydrogen chloride (HCl) and hydrogen fluoride (HF). An ADS consists of:

- An inlet with a cyclone preseparator designed to remove all particles with an aerodynamic diameter of two and one half (2.5) micrometers (μm) or greater;
- An annular denuder to quantitate acidic gases; and
- A filter pack for atmospheric acidity and particles.

During operation, ambient air is drawn through a cyclone and a denuder tube that has glass walls etched and coated with chemicals that absorb the acidic gases of interest. The sampling method will conform to Method IO-4 of the EPA *Compendium of Methods for the Determination of Toxic Inorganic Compounds in Ambient Air*, which is incorporated by reference as part of this QAPP.

5.3.6 Meteorological Station

A meteorological station will operated at the Louisville Police Firearms Training monitoring site. The meteorological station will consist of a 10-meter tower, wind speed and direction transducers, and a temperature sensor. The station will be connected to a data logger. APCD will be responsible for maintaining and polling the site daily with their central data acquisition computer and downloading the meteorological data.

6.0 ANALYTICAL PLAN

6.1 Chemical Analysis

All analyses will conform to EPA SESD's Analytical Support Branch's Quality Action Plan (which is incorporated by reference) and will be performed as described below:

- ***VOCs*** **-** The VOC samples will be analyzed by ion trap chromatography/mass spectroscopy (GC/MS) in full scan mode according to EPA Method TO-15 (U of L is using HP quadra-pole GC-MS system). The list of VOCs included in the TO-15 protocols is listed in Appendix A. Based on a sample size of approximately five liters, the detection limit for these compounds is generally less than one ug/m^3 as shown in Appendix A. Based on TRI reports there are four volatile organics that are not included in the TO-15 method, but which will, nevertheless, be analyzed:

  - ✓ Acrylonitrile;
  - ✓ Chloroprene;
  - ✓ Methyl methacrylate; and
  - ✓ 1,3-Butadiene.

- ***SVOCs*** **-** The SVOC samples will be extracted from the particulate filter and backup PUF/XAD adsorbent in a Soxlet extraction unit for approximately 24 hours using 95% hexane/5% ether. The extract will then be analyzed by GC/MS using EPA Method TO-13A. SVOCs to be analyzed are shown in Appendix A.

- ***Formaldehyde*** **-** The formaldehyde samples will be eluted from the DNPH cartridges and analyzed by high performance liquid chromatography (HPLC) using EPA Method TO-11A.

- ***Metals*** **-** A one inch strip will be cut from the high volume particulate filter as per 40 CFR 50 Appendix G and then extracted using the hot acid procedure and analyzed by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AS) for those elements usually detected at high concentration in environmental media. Inductively Coupled Plasma Mass Spectrometry (ICP-MS) method 200.8 will be employed to achieve the lowest detection limits for the remainder of the analytes (chromium, cadmium, etc.)

- ***HF and HCl*** **-** The HF and HCl samples will be extracted and analyzed by ion chromatography using *Kentucky's Division of Environmental Services Method Number KY-4650* (which is incorporated here by reference). A list of reactive aerosols to be analyzed is listed in Appendix A.

6.2 Holding Times

The holding times for each parameter is described in the table below. For the SVOCs, Method TO-13a requires extraction within 7 days of sample collection. The SVOC analysis will be conducted within 30 days of sample collection.

Parameter	Method	Storage Requirements	Holding Time*	Holding time beyond which results marked "J" (estimated value)	Holding time beyond which results marked "R" (rejected)
VOC	**TO-15a**	**NA**	**30 days**	**40 days**	**50 days**
SVOC	**TO-13a**	**<4°C**	**7 days (extraction)**	**14 days**	**21 days**
Formaldehyde	**TO-11a**	**<4°C**	**14 days**	**21 days**	**30 days**
Metals	**200.7/200.8**	**NA**	**30 days**	**40 days**	**50 days**
HCl and HF	**IO-4**	**NA**	**30 days**	**40 days**	**50 days**

***Any holding time exceedances will be explicitly documented in the case narrative and will identify the specific samples and the exceedance time. Extracts will be analyzed within their holding time; otherwise the case narrative will, likewise, state the samples and holding time exceedances.**

6.3 Sample Control and Documentation

All standard procedures for sample identification, sample control, maintenance of laboratory logs and records, chain of custody, maintenance of field records, and total documentation control (see Appendix E) will conform to the Section 3 of SESD Environmental Investigation Branch Standard Operating Procedures (EIB SOP). In addition, for samples analyzed by the University of Louisville's AQL:

- Canister sample data will be saved by site, by sample date, and by analysis date. The AQL will store a complete data file (including spectrogram and method) on its ChemStation computer and a backup on a 100 mb Iomega Zip disk. Air toxic data files may be forwarded in hard copy, Microsoft ACCESS, or Microsoft Excel.

- Standards verification testing results will be summarized and stored in the Lab SOP Notebooks.

- Canister cleaning logs will be maintained as hardcopy in the AQL, a copy will be filed in the University of Louisville's Material Center Office, and on the Chemstation hard drive.

6.4 Training

All project personnel will take advantage of all relevant training opportunities. Training opportunities include EPA Air Toxic telecourses relating to air toxic monitoring and analysis and DQO subjects, vendor certification, (e.g. Air Academy training by EnTech for University of Louisville AQL personnel), and EPA and Kentucky DAQ workshops.

7.0 LABORATORY QUALITY ASSURANCE PLAN

EPA SESD's ASB will assist APCD and KIESD in determining acceptance criteria for standard gases and internal standards and surrogates. As noted previously, samples will be analyzed in three laboratories, including EPA SESD's laboratory in Athens, Georgia, the University of Louisville's AQL, and Performance Analytical, Inc., in Simi Valley, California. The Kentucky Department of Environmental Protection's laboratory has agreed to provide additional limited quality assurance testing (i.e., approximately four quarterly VOC analyses).

The University of Louisville's AQL is new and currently undergoing certification. To assure that analytical procedures and calibrations performed by this lab are correct, the AQL will prepare standards for analyses by the EPA SESD and Kentucky DES laboratories. These laboratories will also prepare standards for analyses by the University's AQL to assure proper calibration of the GC/MS. During the first year of the study, this calibration certification will be conducted quarterly. In addition, split samples will be analyzed quarterly by the University. Specifically, two split samples will be sent to EPA SESD and one sample to the Kentucky DES lab quarterly to assure data integrity through the project time period.

The University's AQL will initially develop standards for TO-14 compounds, and then

expand to include the TO-15 list of compounds. In terms of verification of standards and consumables, the following are planned:

- Successful completion of "Initial Demonstration of Capability (IDC)" of the Entech Dynamic Diluter used for standard preparation – seven replications, with a standard deviation within the TO-15 requirements.

- Once per quarter – an independent check of AQL's sample standard will be performed by swapping standard canisters with EPA SESD. The required agreement is $\pm$ 30% on each compound.

- Once during the study, an independent check standard will be prepared by an outside source, and analyzed by EPA alongside an equivalent University of Louisville standard.

As noted above, there are four VOCs that will be added to the list of analytes to be assessed, namely:

- Acrylonitrile;
- Methyl methacrylate;
- 1,3-Butidiene; and
- Chloroprene.

Standards for each of these compounds will be developed internally by the University's AQL, with assistance from SESD. In developing the standards for chloroprene, assistance will be also be provided by DuPont Dow Elastomers, the sole manufacturer of this compound.

The Ralph Avenue/Campground Road monitoring site will have two duplicate samplers for SVOCs, formaldehyde, reactive aerosols, and high volume particulates. This site will also have four duplicate monitors for VOCs. This will determine the precision of each method from sample collection through analysis. In addition, the use of split sampling for the Group 2 VOC monitor at this monitoring site will allow for interlaboratory comparison. Two additional canisters, deployed approximately once a quarter, will add to this database.

Both the VOC and SVOC analysis methods have detailed procedures for adding surrogate compounds to a sample prior to analyzing it in order to verify that the analytical procedure is acceptable. These procedures are contained in the SESD ASB's Operations and Quality Control Manual, Section 10-5 (which is incorporated herein by reference). Other checks on the analytical process include:

- Method blanks will be analyzed with each set of samples.

- For the VOCs, one canister will be checked for each batch that is cleaned to verify the

effectiveness of the canister cleanup.

- Initial and final pressures will be recorded for each VOC sample taken to verify that there were no pneumatic leaks.

- Flow rate stability will be verified by measuring initial and final flow rates as appropriate.

- Every 10th particulate filter will be analyzed in duplicate to verify the accuracy of metals analysis.

- Every 10th reactive aerosol sample will be analyzed in duplicate to verify analytical results.

- Each sample taken will be accompanied by a form specific to that sample which will include all necessary sampling data (i.e. sampling site, sample date, flow rates, sampling duration, and any comments).

8.0 DATA VALIDATION AND USABILITY

All data will be reviewed by EPA SESD, APCD, and the University of Louisville's laboratory analysts and environmental scientists. EPA SESD will be responsible for providing final data validation of the samples collected at the six Group 1 monitoring sites. APCD and the University of Louisville will be responsible for providing final data validation of the samples collected at the six Group 2 monitoring sites and their duplicate monitor at the Ralph Avenue/Campground Road site. SESD's Office of Quality Assurance (OQA) will review and provide final validation for the formaldehyde data to ensure that the relevant quality assurance/quality control (QA/QC) procedures were met by the contract laboratory performing the formaldehyde analysis. The Kentucky DES laboratory will provide final data validation for the quarterly VOC split samples.

Data validation will be performed by each laboratory responsible for submitting analytical results for this project (with the exception of PAL). In general U of L will be responsible for validating and verifying the accuracy and usability of their data. SESD-ASB will be responsible for validating and verifying the accuracy and usability of their data. Both labs will perform validation in accordance with ASBs OQCM, Section 10.11. The formaldehyde data provided by PAL will be validated by SESD's QA staff in accordance with method-specific and laboratory established QC requirements and will be documented in a case narrative. These requirements include the evaluation of initial and continuing calibrations, method blank analyses, laboratory spike recoveries (for accuracy and precision measurements – where applicable), field blank analyses, proper identification of analytes and holding times criteria. Qualification of analytical data deemed outside these criteria will be assigned one of the following data flags:

- "J" – Estimated based on non-adherence to applicable QC criteria.

- "R" – Analytical data considered unusable and rejected.

For both J and R data qualified as described above, a case narrative will be provided that details the QA/QC issues that resulted in these flags. The narrative will identify the exact samples which were problematic and why. This is especially important since the J flag has multiple meanings (see below), some of which may cause the data to be rejected from use in the risk assessment, and some of which may not.

Additional data flags may be assigned to compliant data (i.e., those that meet QA/QC requirements) are as follows:

- "U" – Material was analyzed for but not detected; the number is the minimum quantitation limit

- "A" – Average value

- "J" – Estimated Value

- "N" – Presumptive evidence of presence of material

For data qualified as described above, a case narrative will be provided that details any QA/QC or other issues that resulted in these flags, if deemed necessary.

EPA SESD does not plan to release any preliminary data from Group 1 monitors outside EPA. Only a single, finalized package of validated data and case narrative is planned for release at the end of the sampling period. Preliminary results developed by the AQL from Group 2 monitors may, however, be sent to APTMD upon completion of laboratory analysis. To ensure proper reporting of the analytical data to users and the public, no preliminary data will be released outside the above noted agencies until all quality assessment procedures have been completed and the data has been certified as valid by the analyzing laboratory.

The EPA SESD data (including formaldehyde) will be reported on hardcopy and in electronic formats (using EPA's R4LIMS) and will include analyte concentrations, quantitation limits for undetected analytes, and data qualifiers, where applicable. The exact meaning of the data qualifiers will be reported on the hardcopy along with all appropriate sample identification information (e.g., sample numbers, sampling date, etc.) and will include a case narrative. The AQL laboratory will provide similar results. SESD and the AQL will be responsible for maintaining the data record for the samples they analyzed. The final validated data will also be submitted to AIRS by batch jobs, as it becomes available.

Ultimately, both labs will develop validated data that is transparent to the risk assessors.

Specifically, the risk assessors will ultimately receive from both groups (SESD and the AQL) environmental data in the same electronic formats that include consistent fields, consistent reporting methods, consistent data qualifiers, and case narratives outlining any data quality issues. The risk assessment process will not be amenable to combining data that was reported by disparate methodologies. (To the extent possible, the Kentucky DES will analyze, validate, and report split VOC samples using the methodologies outlined herein). The labs will coordinate, as necessary, to ensure that the risk assessors receive consistent data packages in both hardcopy and electronic forms from the various laboratories.

Data usability by the risk assessors will generally be guided by Chapter 5 of the Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Manual (Part A), Interim Final. For example, this chapter states that if a chemical is found in some, but not all samples, a surrogate concentration of one-half the sample quantitation limit may be used for an analyte that is not detected in a particular sample.

Final validated data from Group 2 monitoring sites will be posted onto the Internet at the web site maintaining by the Kentucky Pollution Prevention Center. Data will be retrievable by sampling site or date. Chart and graphic capacities will be designed into the web page to allow citizens to review short and long term trends in air quality.

Depending on time and other considerations, APCD and the AQL may provide summary air toxics analytical data reports of Group 2 related to this study to EPA SESD in both electronic and hardcopy forms. If this happens, EPA SESD will combine this information with data collected from the Group 1 monitors and issue a final summary report of the air toxics analytical data to the CBEP Partners as soon as possible, but no later than six months of receiving the last sample analyses. Table 6 displays a proposed summary of all reports related to this CBEP project.

Table 6
Proposed Project-Specific Reports for the West Louisville CBEP

#	Report Name/Type	Frequency	Distribution	By
1	Monthly Field Sampling Run Report	Monthly	CBEP Team	APCD
2	Monthly Data Recovery Report	Monthly	CBEP Team	APCD/AQL
3	Monthly AIRS Air Toxic Data Report	Monthly	CBEP Team	APCD/KY DAQ
4	Quarterly Lab Calibration Report	Quarterly	CBEP Team	AQL and SESD Labs
5	Quarterly Sampler Calibration Report	Quarterly	CBEP Team	APCD
6	Semi-annual or Quarterly Field Audit Report	Semi-annual	CBEP Team	KY DAQ and SESD
7	Web Page Monthly Update on status of study	Monthly	Public	KPPC

8	Summary Air Toxics Analytical Data Report	No later than 6-months following completion of final analysis	Public	EPA and AQL

9.0 TIME LINE FOR GROUP 1 AND GROUP 2 MONITORING EFFORTS FOR WEST LOUISVILLE AIR TOXIC PROJECT

August 26, 1999 — APCD submitted to EPA for a FY 99 increase award of 105 grant of $57,205 for West Louisville Air Toxic Project

October 12, 1999 — EPA Region 4 reviewed and approved proposed six (6) sites and a location of collocated site, Ralph Ave, for CBEP (Phase II, Group 1 sites of West Louisville Air Toxic Project)

November 4, 1999 — APCD received quotes for installation of electrical service panels, platforms, and fence for six Group 1 of CBEP sites

November 9, 1999 — EPA CBEP monthly conference call participated by West County Community Task Force, APCD, and University of Louisville tracking the progress of the preparation of site installation and quality assurance project plan

November 19, 1999 — Group 1 - APCD obtained site permissions from Old Lake Dreamland Fire Department, Site # 3, and St. Stephen Baptist Church, Site #4.
Group 2 - APCD obtained site permission from New Lake Dreamland Fire Department, Site # 10

December 2, 1999 — Group 1 - APCD obtained site permission from University of Louisville (UL) for Shelby Campus control site

December 22, 1999 — Group 1 & 2 - Owner at Ralph Ave site (Site # 2), 4211 Campground Road, signed the lease agreement

January 11, 2000 — Group 1 & 2 - Jefferson County Fiscal Court approved the lease for the Site # 2 at 4211 Campground Road

January 28, 2000 — Group 2 - Contacted JCPS, Susan Biasiolli, for the relocation of Southwick Community Center site #7 to Carter-DuValle Elementary School and the establishment of three community/neighbor sites at three different schools - initial contact for the three school sites including Farnsley M. S. (site #8), M. L. King Elementary (site # 11), and Cane Run Elementary (Site # 12).

February 15, 2000	EPA Region 4 provided comments to APCD/UL on the draft quality assurance project plans (QAPP).
March 1, 2000	Group 2 - Met with JCPS, Jim Vaughn and Chuck Fleischer, and requested for permissions to use four schools for air toxic group 2 sites - including a relocation from Southwick Community Center to Carter-DuValle Elementary School (site #7), Farnsley Middle School (site #8), M. L. King Elementary School (site #11), and Cane Run Elementary School (site #12). The relocation request was denied by JCPS. The reason for denying our request was based on the ongoing extensive construction that would prevent any useful air monitoring efforts.
March 8, 2000	Group 2 - Met with private resident, Mr. and Mrs. Virgil Thomas, north of Chickasaw Park area, at 942 S. 47th Street for requesting a permission of a VOC monitoring site. Mr. and Mrs. Thomas granted the permission for a Group 2 VOC site (site # 9).
March 15, 2000	APCD incorporated with EPA's comments into QAPP and send the plan to EPA for final review and approval.
April 1, 2000	Group 1 - APCD receives CBEP monitors including VOC 6-liter canisters with passive air samplers, SVOC high volume PUF/XAD samplers, DNPH cartridges for formaldehyde, URG-3000C Annular Denuder System for HCl and HF acidic aerosol, and total suspended particulate high volume samplers for metals.
April 18, 2000	Group 1 (West Louisville CBEP Air Toxic Monitoring Network) field sampling is partially operational.
May 24, 2000	Group 1 (West Louisville CBEP Air Toxic Monitoring Network) field sampling is operational.
June 12, 2000	Group 2 - APCD received a final approval from Mike Mulheirm, Executive Director of Facilities and Transportation, Jefferson County Public School, for three school sites including Farnsley M. S. (site #8), M. L. King Elementary (site # 11), and Cane Run Elementary (Site # 12).
June 17, 2000	Group 2 (West Louisville Community/Neighborhood VOC Air Toxic Monitoring Network) field sampling is operational.
May 19, 2001	Group 1 - West Louisville CBEP Air Toxic Monitoring Network field sampling is completed.
June 17, 2001	Group 2 (West Louisville Community/Neighborhood VOC Air Toxic

	Monitoring Network) field sampling is completed.
Monthly	Reviewing of data generation and data validation by EPA, APCD and U of L.
Monthly or Quarterly	EPA Region 4 conducts oversight conference calls on any implementation problems.
Quarterly	EPA Region 4 and/or KYDAQ conduct quarterly quality assurance audits.
No later than six months (After final sampling date)	EPA Region 4 provides final analytical report.

10. REFERENCES

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Appendix A

Required Minimum Quantitation Limits for Air Toxics Risk Assessment

and

Achievable Minimum Quantitation Limits by Analytical Labs

Volatile Organic Chemicals
(All units are in ug/m^3)

Chemical	Risk Assessment Required MQL	SESD Achievable MQL	U of L AQL Achievable MQL
Volatile Organic Chemicals			
P-CHLOROTOLUENE	No value	1.0	TBD
(M- AND/OR P-)XYLENE	730	3.0	2.2
1,1,1,2-TETRACHLOROETHANE	0.24	1.5	3.4
1,1,1-TRICHLOROETHANE	230	1.0	0.6
1,1,2,2-TETRACHLOROETHANE	0.031	1.5	3.5
1,1,2-TRICHLOROETHANE	0.11	1.5	2.8
1,1-DICHLOROETHANE	51	1.0	2.0
1,1-DICHLOROETHENE	0.036	1.0	2.0
1,1-DICHLOROPROPENE	No value	1.0	TBD
1,2 DICHLOROPROPANE	0.092	1.0	2.3
1,2,3-TRICHLOROBENZENE	No value	2.0	TBD
1,2,3-TRICHLOROPROPANE	0.0031	1.5	TBD
1,2,4-TRICHLOROBENZENE	21	1.5	3.7
1,2,4-TRIMETHYLBENZENE	0.62	1.0	2.5
1,2-DIBROMO-3-CHLOROPROPANE	0.021	2.0	TBD
1,2-DICHLOROBENZENE	33	1.5	3.0
1,2-DICHLOROETHANE	0.069	1.0	2.0
1,3,5-TRIMETHYLBENZENE	0.62	1.0	2.5
1,3-BUTADIENE	0.0035	0.5	2.1
1,3-DICHLOROBENZENE	0.33	1.5	3.0
1,3-DICHLOROPROPANE	No value	1.0	TBD
1,4-DICHLOROBENZENE	0.28	1.5	3.0
2,2-DICHLOROPROPANE	No value	1.0	TBD
ACETONE	37	5.0	1.2
ACRYLONITRILE	0.026	0.5	TBD
BENZENE	0.22	1.0	1.6
BROMOBENZENE	No value	1.5	TBD
BROMOCHLOROMETHANE	No value	1.0	TBD
BROMODICHLOROMETHANE	0.1	1.5	3.4
BROMOFORM	1.6	6.5	5.2
BROMOMETHANE	0.51	1.0	2.0
CARBON DISULFIDE	73	1.0	1.6
CARBON TETRACHLORIDE	0.12	1.5	3.2
CHLOROBENZENE	6.2	1.0	2.3
CHLOROETHANE	2.2	1.0	1.3
CHLOROFORM	0.031	1.0	2.5
CHLOROMETHANE	1.8	0.5	1.0

Chemical	Risk Assessment Required MQL	SESD Achievable MQL	U of L AQL Achievable MQL
CHLOROPRENE	No value	1.0	TBD
CIS-1,2-DICHLOROETHENE	3.7	1.0	2.0
CIS-1,3-DICHLOROPROPENE	0.048	1.0	2.3
DIBROMOCHLOROMETHANE	0.075	2.0	4.3
DIBROMOMETHANE	3.7	1.5	3.6
DICHLOROFLUOROMETHANE	No value	1.0	2.5
ETHYL BENZENE	110	1.0	2.2
FORMALDEHYDE	0.14	TBD	TBD
HEXACHLOROBUTADIENE	0.073	2.5	5.4
ISOPROPYLBENZENE	40	1.0	TBD
METHYL ACRYLATE	11	1.0	TBD
METHYL BUTYL KETONE	0.51	1.0	2.1
METHYL ETHYL KETONE	100	1.0	1.5
METHYL ISOBUTYL KETONE	7.3	1.0	2.1
METHYL METHACRYLATE	73	1.0	TBD
METHYLENE CHLORIDE	3.8	1.0	1.8
NAPHTHALENE	0.33	1.5	TBD
N-BUTYLBENZENE	15	1.5	TBD
N-PROPYLBENZENE	15	1.0	TBD
O-CHLOROTOLUENE	7.3	1.0	TBD
O-XYLENE	730	1.0	2.2
P-ISOPROPYLTOLUENE	No value	1.5	TBD
SEC-BUTYLBENZENE	15	1.5	TBD
STYRENE	100	1.0	2.2
TERT-BUTYLBENZENE	15	1.5	TBD
TETRACHLOROETHENE	3.1	1.5	3.4
TOLUENE	42	1.0	1.9
TRANS-1,2-DICHLOROETHENE	7.3	1.0	2.0
TRANS-1,3-DICHLOROPROPEN	0.048	1.0	2.3
TRICHLOROETHENE	1	1.0	2.7
TRICHLOROFLUOROMETHAN	73	1.5	2.8
VINYL ACETATE	21	1.0	1.8
VINYL CHLORIDE	0.021	1.0	1.3

TBD = To be determined.

Semi-Volatile Organic Chemicals
(All units are in ug/m^3)

Chemical	Risk Assessment Required MQL	SESD Achievable MQL
Semi-Volatile Organic Chemicals		
(3-AND/OR 4-)METHYLPHENOL	1.8	0.033
BENZYL BUTYL PHTHALATE	73	0.033
1,2,4-TRICHLOROBENZENE	21	0.033
2,3,4,6-TETRACHLOROPHENOL	11	0.033
2,4,5-TRICHLOROPHENOL	37	0.033
2,4,6-TRICHLOROPHENOL	0.63	0.033
2,4-DICHLOROPHENOL	1.1	0.033
2,4-DIMETHYLPHENOL	7.3	0.033
2,4-DINITROPHENOL	0.73	0.067
2,4-DINITROTOLUENE	0.73	0.033
2,6-DINITROTOLUENE	0.37	0.033
2-CHLORONAPHTHALENE	29	0.033
2-CHLOROPHENOL	1.8	0.033
2-METHYL-4,6-DINITROPHENOL	No Value	0.067
2-METHYLNAPHTHALENE	No Value	0.033
2-METHYLPHENOL	18	0.033
2-NITROANILINE	0.0021	0.033
2-NITROPHENOL	No Value	0.033
3,3'-DICHLOROBENZIDINE	0.014	0.033
3-NITROANILINE	No Value	0.033
4-BROMOPHENYL PHENYL ETHER	No Value	0.033
4-CHLORO-3-METHYLPHENOL	No Value	0.033
4-CHLOROANILINE	1.5	0.033
4-CHLOROPHENYL PHENYL ETHER	No Value	0.033
4-NITROANILINE	No Value	0.033
4-NITROPHENOL	2.9	0.067
ACENAPHTHENE	22	0.033
ACENAPHTHYLENE	No Value	0.033
ANTHRACENE	110	0.033
BENZO(A)ANTHRACENE	0.0086	0.033
BENZO(B)FLUORANTHENE	0.0086	0.033
BENZO(GHI)PERYLENE	No Value	0.033
BENZO(K)FLUORANTHENE	0.086	0.033
BENZO-A-PYRENE	0.002	0.033
BENZYL BUTYL PHTHALATE	73	0.033
BIS(2-CHLOROETHOXY)METHANE	No Value	0.033

Chemical	Risk Assessment Required MQL	SESD Achievable MQL
BIS(2-CHLOROETHYL) ETHER	0.0057	0.033
BIS(2-CHLOROISOPROPYL) ETHER	0.18	0.033
BIS(2-ETHYLHEXYL) PHTHALATE	0.45	0.033
CARBAZOLE	0.31	0.033
CHRYSENE	0.86	0.033
DIBENZO(A,H)ANTHRACENE	0.00086	0.033
DIBENZOFURAN	1.5	0.033
DIETHYL PHTHALATE	290	0.033
DIMETHYL PHTHALATE	3700	0.033
DI-N-BUTYLPHTHALATE	37	0.033
DI-N-OCTYLPHTHALATE	7.3	0.033
FLUORANTHENE	15	0.033
FLUORENE	15	0.033
HEXACHLOROBENZENE (HCB)	0.0039	0.033
HEXACHLOROBUTADIENE	0.08	0.033
HEXACHLOROCYCLOPENTADIENE (HCCP)	0.0073	0.033
HEXACHLOROETHANE	0.37	0.033
INDENO (1,2,3-CD) PYRENE	0.0086	0.033
ISOPHORONE	6.6	0.033
NAPHTHALENE	0.33	0.033
NITROBENZENE	0.22	0.033
N-NITROSODI-N-PROPYLAMINE	0.00089	0.033
N-NITROSODIPHENYLAMINE/DIPHENYLAMINE	1.3	0.033
PENTACHLOROPHENOL	0.052	0.067
PHENANTHRENE	No Value	0.033
PHENOL	220	0.033
PYRENE	11	0.033

Metals in Particulates and Reactive Aerosols
(All units are in ug/m^3)

Chemical	Risk Assessment Required MQL	SESD Achievable MQL
Metals in Particulates		
Antimony	0.15	0.000030
Arsenic	0.00041	0.000151
Barium	0.051	0.00301
Beryllium	0.00075	0.000030
Cadmium	0.00099	0.000030
Chromium	0.00015	0.00015
Cobalt	22	0.0030
Copper	15	0.0030
Lead	1.5**	0.00060
Manganese	0.0052	0.00015
Molybdenum	1.8	0.0030
Nickel	0.0075	0.00015
Selenium	1.8	0.0030
Silver	1.8	0.0030
Strontium	220	0.0030
Thallium	0.026	0.0012
Tin	220	0.0030
Titanium	3.1	0.0030
Vanadium	2.6	0.0030
Zinc	110	0.0030
Reactive Aerosols		
HCl	2.1	0.65
HF	No Value	0.65

*Note that nominal detection limits for SVOCs are based on approximately 325 m^3 of air sampled. The nominal detection limits for metals are based on approximately 1500 m^3 of air sampled. Detection limits for HCl and HF are based on approximately 14.4 m^3 of air sampled . Actual quantitation limits may vary from the values given.

** The value give is the National Ambient Air Quality Standard (NAAQS) for lead.

Appendix B

West Louisville Air Toxics Study Team

Personnel Roles

Personnel	Agency	Role
Arnita Gadson	West County Community Task Force Coordinator	Task Force Coordinator
Art Williams	APCD	Director, APCD, coordinates APCD's participation in the study and interfaces with the task force.
Arthur Chang	APCD	Technical Service Supervisor, APCD, coordinates among EPA, APCD, U OF L, KY DAQ, & KY DES.
Marty Layman	APCD	Technical Specialist II, coordinating field monitoring activities
Bryan Frazar	APCD	Scientific Programmer/Analyst, coordinating Air Toxics Databases from APCD, Uof L, & EPA.
Ron Jacobs	APCD	Sample Collection for PM2.5 and toxics
Kelley Bennett	APCD	Technical Specialist II, sample and meteorological data collection
Mario Beeler	APCD	Sample collection
Mark Bradley	APCD	Sample collection for PM10 and toxics
Damon Harris	APCD	Sample and meteorological data collection
Russ Barnett	U OF L	Coordinates U OF L's participation in the Air Toxics Study
R.M. (Mark) Schreck, P.E.	U OF L	Director, Materials Center, coordinates the Air Quality Laboratory
Shwantay R. Jordan	U OF L	Graduate Student, sample collection
John Metaxas	U OF L	GC/MS Specialist, coordinates the VOC sample analyses by GC/MS.
Dr. Geoffrey Cobourn	U OF L	Professor, Dept of Mechanical Engineering, U of L, provides oversight in samples collection and analyses.
Cam Metcalf	Kentucky Pollution Prevention Center, University of Louisville	Executive Director, budget administration, public outreach, support to West County Task Force, provides technical assistance to industry on pollution prevention.
Leslie Montgomery	U.S. EPA, APTMD, Atlanta, GA	West Louisville CBEP Coordinator
Dr. Kenneth Mitchell	U.S. EPA, APTMD, Atlanta, GA	EPA Region 4 Air Planning Branch Risk Assessor

Personnel	Agency	Role
Danny France	U.S. EPA, SESD, Athens, GA	Coordinates air toxics study among EPA, Jefferson County and the University of Louisville
Denise Goddard	U.S. EPA, Region 4, Office of Quality Assurance, Science and Ecosystem Support Division Athens, GA	Performs the quality assurance/quality control oversight and data validation activities for formaldehyde data generated by contract laboratory.
Bill Cosgrove	U.S. EPA, Region 4, Office of Quality Assurance, Science and Ecosystem Support Division Athens, GA	Reviews and approves Quality Assurance Project Plan (QAPP) and QA related requirement.
Irwin G. Cohen	Kentucky Dept. of Environmental Protection, Div. of Environmental Services, Frankfort, KY	Chief Chemist, Air Toxics Monitoring Section, provides the technical support to U of L, Air Quality Laboratory.
Larry Garrison	Kentucky Dept. of Environmental Protection, Division for Air Quality, Frankfort, KY	Provides the technical support to APCD
West County Task Force		Public outreach, identification of monitoring sties, input into study design, review of data generated.

Appendix C

Sampling Dates

2000 – 2001 Sampling Dates; 12 Day Schedule

Month	Sampling Event Number	Date	Day of Week
May 2000	1	24	W
June	2	5	M
	3	17	Sa
	4	29	Th
July	5	11	Tu
	6	23	Su
August	7	4	F
	8	16	W
	9	28	M
September	10	9	Sa
	11	21	Th
October	12	3	Tu
	13	15	Su
	14	27	F
November	15	8	W
	16	20	M
December 2000	17	2	Sa
	18	14	Th
	19	26	Tu
January 2001	20	7	Su
	21	19	F
	22	31	W
February	23	12	M
	24	24	Sa
March	25	8	Th
	26	20	Tu
April	27	1	Su
	28	13	F
	29	25	W
May	30	7	M
	31	19	Sa

Distribution by day of week:

1. Sunday – 4 samples
2. Monday – 5 samples
3. Tuesday – 4 samples
4. Wednesday – 5 samples
5. Thursday – 4 samples
6. Friday – 4 samples
7. Saturday – 5 samples

TOTAL = 31 samples

Appendix D

Monitoring Site Locations

Population Centers

Major Air Emission Source Locations

Group 1 Monitoring Sites

Monitoring Site Number	*Site Name Address*	*AIRS ID Number (Site ID Code) (POC Number)*	*Latitude/ Longitude*	*Rationale*
1	Louisville Police Firearms Training 4201 Algonquin Pkwy Louisville, KY 40211	21 111 1041 (FT) (1)	N 38 13 37.0 W 85 49 24.0	***Potential Maximum Impact Site.*** The objective will be a fenceline monitoring for Louisville's major petroleum terminals including Marathon Ashland Petroleum LLC, CITGO, BP Oil, Chevron USA, and others. It is also located immediately downwind from Rubbertown industrial complex. This site is an existing SO2 maximum concentration neighborhood scale of National Ambient Monitoring Station (NAMS). It comes with a potentially high lead concentration source from the firearms training facility. This site will be located with a meteorological station.
2	Ralph Avenue 4211 Campground Road Louisville, KY 40216	21 111 0054 (RC) (1 – main station; 2 – duplicate station)	N 38 12 40.3 W 85 50 26.2	***Potential maximum impact and general neighborhood population exposure site.*** The objective will be a fenceline monitoring, for DuPont, Rohm & Haas, America Synthetic Rubber, and other core Rubbertown industries. This site is also a neighborhood population exposure for the Cane Run community. A collocated site will be located here for obtaining QA/QC data.
3	Old Lake Dreamland Fire Department 4603Campground Road Louisville, KY 40216	21 111 0055 (OL) (1)	N 38 12 19.1 W 85 51 09.5	***General neighborhood population exposure site.*** The objective will be to characterize potential exposure of individuals living in Lake Dreamland community where maximum impact from industries in the Rubbertown area could be occurring.
4	St. Stephen Baptist Church 1008 S. 15th Street Louisville, KY 40210	21 111 0056 (SB) (1)	N 38 14 32.0 W 85 46 39.8	***General neighborhood population exposure site.*** The objective will be to characterize the potential population exposure. This church is located in the heart of the West Louisville and is one of the largest churches in the area. St. Stephen Baptist Church serves the majority of West Louisville neighborhoods including Algonquin, California, Chickasaw, Hallmark, Park Duvalle, Park Hill, Parkland, Russell, and Shawnee. These communities are located directly downwind from the Rubbertown industrial complex.
5	Shelby Campus, University of Louisville 9001Shelbyville Road, Louisville, KY 40222	21 111 0057 (SC) (1)	N 38 13 09.0 W 85 34 59.0	***Anthropogenic Urban Activity Control Site.*** The objective of this site will be to determine the air quality in the residential areas of east Jefferson County that should not be impacted by the emissions from the Rubbertown industrial complex. This location will be still likely impacted by vehicle emissions from a major high traffic corridor - the Shelbyville Road / Hurstbourne Parkway/I-64 Corridor.
6	Otter Creek Park 850 Otter Creek Park Rd., Brandenbury, KY 40108 (Meade County)	21 163 0002 (OC) (1)	N 37 56 51.5 W 86 02 34.8	***Background site.*** This site is located in a predominately upwind direction from outside Jefferson County. The objective will be to aid in assessing out of county transport of pollution from south and west parts of Kentucky. This site is a remote, pristine, public natural park and is approximately 25 miles southwest of Rubbertown/West Louisville.

Group 2 Monitoring Sites

Monitoring Site Number	*Site Name Address*	*AIRS ID Number (Site ID Code) (POC Number)*	*Latitude/ Longitude*	*Rationale*
2	Ralph Avenue 4211 Campground Road Louisville, KY 40216	21 111 0054 (RC) (3 – Group 2 main; 4 – Group 2 duplicate; 5 - EPA-SESD QA; & 6 - KY DAQ QA)	N 38 12 40.3 W 85 50 26.2	***Potential maximum impact and general neighborhood population exposure site.*** The main objective will be to setup a main fenceline monitoring station (POC =3) of Group 2 for DuPont, Rohm & Hass, America Synthetic Rubber, and other core Rubbertown industries. A duplicate of VOC monitor (POC = 4) is designed for Group 2's precision data. The 5th VOC station is designed for quarterly interlaboratory comparison between AQL and EPA-SESD. The 6th VOC station is designed for quarterly interlaboratory comparison between AQL and KYDES.
7	Park Duvalle /Southwick Community Center 3621 Southern Ave. Louisville, KY 40211	21 111 0043 (SW) (1)	N 38 13 49.60 W 85 49 11.8	***Neighborhood population exposure site.*** The objective will be to characterize potential exposure of individuals living in Park Duvalle community where maximum impact from industries in the Rubbertown area could be occurring. This site is also housing the existing Jefferson County's PM2.5 and PM10 monitoring stations and this site will be relocated pending renovation of this community center.
8	Farnsley M. S. 3400 Lees Lane Louisville, KY 40216	21 111 0058 (FM) (1)	N 38 11 03.2 W 85 50 45.8	***Neighborhood population exposure site.*** The objective will be to characterize potential exposure of individuals living in Cane Run, Riverside Gardens, and Shively communities where maximum impact from industries in the Rubbertown area could be occurring.
9	Chickasaw Park 942 S. 47th St. Louisville, KY 40211 (Private Residence)	21 111 0060 (CP) (1)	N 38 14 44.7 W 85 49 58.1	***Neighborhood population exposure site.*** The objective will be to characterize potential exposure of individuals living in Chickasaw, Westover, Shawnee, and Portland communities/neighborhoods where maximum impact from industries in the Rubbertown area could be occurring. This site is also designed for detecting the VOC emissions from Gallagher coal-fired power plant located northwest directly across the Ohio River.
10	New Lake Dreamland Fire Department (NL) 4603 Cane Run Road Louisville, KY 40216	21 111 0059 (NL) (1)	N 38 11 35.5 W 85 50 45.8	***Neighborhood population exposure site.*** The objective will be to characterize potential exposure of individuals living in Cane Run and Shively communities where maximum impact from industries in the Rubbertown area could be occurring.
11	M. L. King Elementary 4325 Vermont Ave. Louisville, KY 40210	21 111 0061 (MK) (1)	N 38 15 26.3 W 85 49 46.8	***Neighborhood population exposure site.*** The objective will be to characterize potential exposure of individuals living in Shawnee and Portland communities where maximum impact from industries in the Rubbertown area could be occurring.
12	Cane Run Elementary 3951 Cane Run Rd. Louisville, KY 40222	21 111 0062 (CR) (1)	N 38 12 34.8 W 85 49 20.8	***Neighborhood population exposure site.*** The objective will be to characterize potential exposure of individuals living in Cane Run, Hallmark, and Park Duvalle communities where maximum impact from industries in the Rubbertown area could be occurring.

POPULATION CENTERS AND SCHOOLS

A Duvalle Education Center
N 38 13' 41"
W 85 48' 54"
(In the center of a neighborhood adjacent to Rubbertown)

B John F. Kennedy Elementary School
N 38 13' 53"
W85 49' 06"
(Near I-264 and near Park Duvalle neighborhood)

C Can Run Elementary School
N 38 12' 34"
W85 49' 23"

D St. Dennis Parochial Elementary School
N 38 12' 03"
W85 50' 05"

E Wellington Elementary School
N 38 10' 56"
W85 51' 43"

AIR EMISSION FACILITY LOCATIONS

A1 America Synthetic Rubber
N 38 12' 32"
W85 50' 45"
Site Located at 4500 Campground Road

A2 Superior Chemical
N 38 12' 04"
W85 51' 43"
Site Located at 4211 Campground Road

A3 Whyane Supply
N 38 14' 10"
W85 49' 32"
Site Located at 1400 Cecil and is a regional heavy equipment supplier

A4 BASF
N 38 13' 27"
W85 49' 25"
At corner of 41th St

A5 Paddy Run Power Plant
N 38 13' 16"
W85 50' 46"

A6 B P Oil, Lou Terminal
N 38 13' 57"
W85 50' 03"
1500 Southwestern Pkwy

A7 The Carbide/Graphite Group
N 38 13' 08"
W 85 49' 49"
4400 Bells Ln

A8 Chevron USA, Bells Ln
N 38 13' 30"
W85 49' 40"
4401 Bells Ln

A9 CITGO Petroleum Corporation
N 38 12' 22"
W 85 51' 04"
4724 Camp Ground Rd

A10 DuPont Dow Elastomers, L.L.C.
N 38 12' 56"
W85 50' 34"
4242 Camp Ground Rd

A11 Eckart Aluminum L.P.
N 38 12' 53"
W85 50' 19"
4101 Camp Ground Rd

A12 E I duPont De Nemours & Co
N 38 12' 56"
W85 50' 31"
4200 Camp Ground Rd

A13 Louisville Algonquin Terminal
N 38 13' 55"
W85 49' 49"
4510 Algonquin Pkwy

A14 Marathon Ashland Petroleum LLC
N 38 50' 53"
W85 50' 53"
3920 Kramers Ln

A15 Rohm & Haas Kentucky, Inc.
N 38 12' 41"
W85 50' 34"
4300 Camp Ground Rd

Appendix E

Specific Documentation Format and Content Requirements for
West Louisville Air Toxics Study

From EPA Region 4's *ASB Quality Assurance Manual, 1997*

1. Chain of Custody Seal -- see From 3-1 of ASB's Quality Assurance Manual for VOC Canisters
2. Chain of Custody Record-- see From 3-2 of ASB's Quality Assurance Manual
3. GC Screen Log Book – see Form 10-4 of ASB's Quality Assurance Manual
4. Stock Standard Log Book – see Form 10-6 of ASB's Quality Assurance Manual
5. Stock Summary Log Book – see Form 10-7 of ASB's Quality Assurance Manual
6. GC Analysis Log Book – see Form 10-8 of ASB's Quality Assurance Manual
7. GC/MS Logbook—see Form 10-5 of ASB's Quality Assurance Manual
8. GC Master Logbook – see Form 10-10 of ASB's Quality Assurance Manual
9. Dilution Standard Log Book – see Form 10-15 of ASB's Quality Assurance Manual

From EPA Region 4's *EISOPQAM, 1997 Revisions*

1. Field Sample Tag form – see Figure 3-1
2. EPA Custody Seal – see Figure 3-2
3. Receipt for Samples Form – Figure 3-4

APPENDIX F

Kentucky State-Wide Air Toxic (KY DAQ) Network*
(Excluding Jefferson County)
SITE AND AIRS INFORMATION

Kentucky State-Wide Air Toxic (KY DAQ) Network*

(Excluding Jefferson County - see Appendices H & I)

SITE AND AIRS INFORMATION

#	SITE TYPE / MONITORING OBJECTIVE	AIRS ***
1	Lexington - 650 Newton Pike (Fayette County) Primary** and Air Toxics -VOC, PUF, AD, Metals Monitoring Objective : Community – Lexington	AIRS Number: 21-067-0012
2	Fort Thomas - 700 Alexandria Pike (Campbell County) Primary** and Air Toxics -VOC, PUF, AD, Metals Monitoring Objective : Community - Northern Kentucky/Cincinnati	AIRS Number: 21-037-0003
3	Shepherdsville - Sherpherdsville Middle School 2nd Street (Bullitt County) Primary** and Air Toxics -VOC, PUF, AD, Metals Monitoring Objective : Community - Shepherdsville and **Transport - (upwind southerly) to Louisville**	AIRS Number: 21-029-0006
4	Ashland (Main) - 32 & Railroad Street (Boyd County) Primary** and Air Toxics - VOC, PUF, AD, Metals Monitoring Objective : Community – Ashland	AIRS Number: 21-019-0014
5	Ashland (Duplicate) - 32 & Railroad Street (Boyd County) Primary** and Air Toxics - VOC, PUF, AD, Metals Monitoring Objective : Community – Ashland	AIRS Number: 21-019-0014
6	Owensboro - US 60 & Pleasant Valley Road (Daviess County) Primary** and Air Toxics - VOC, PUF, AD, Metals Monitoring Objective : Community – Owensboro	AIRS Number: 21-059-0005
7	Paducah - 2901 Powell Street (McCracken County) Primary** and Air Toxics - VOC, PUF, AD, Metals Monitoring Objective : Community – Paducah	AIRS Number: 21-145-1024
8	Bloodworth Farm (Livingston County) Air Toxic - VOC Monitoring Objective : Max./Trends (Calvert City Industrial Complex)	AIRS Number: 21-139-0004
9	Buckner - Oldham County DOT Garage (Oldham County) Air Toxics - VOC canister and DES mobile VOC laboratory Monitoring Objective: **Transport (from Metro Louisville)**	AIRS Number: 21-185-0004
10	Versailles - Simmons Elementary (Woodford County) Air Toxics - VOC, HF, Metals Monitoring Objective: Max. Impact (Osram Sylvania Inc.)	AIRS Number:

* The information for this table was derived from a draft Kentucky Air Toxic Monitoring Quality Assurance Project Plan courtesy of Kentucky Division for Air Quality.

** Primary Site - monitoring site that contains (SO2), NOx, (CO), Ozone, (PM2.5) and PM10 samplers.

***** AIRS =** Aerometric Information Retrieval System M:\aq\toxics\workplan\Tables&\kyswairs.doc